DOCUMENT RESUME

ED 093 280 IR 000 761

AUTHOR Bardwell, John
TITLE Information Delivery Systems--The Alternative of Cable TV.
INSTITUTION Syracuse Univ., N.Y. Center for the Study of Information and Education.
PUB DATE 74
NOTE 38p.; For related document, see IR 000 760

EDRS PRICE MF-$0.75 HC-$1.85 PLUS POSTAGE
DESCRIPTORS *Cable Television; *Community Planning; *Educational Planning; Information Networks; Information Scientists; Information Systems; Instructional Television; Public Television; State of the Art Reviews; *Video Equipment

ABSTRACT

Cable television offers great benefits in its large information carrying capacity, its local and selective character, and its two-way capability. A key fact in the history of cable television is that in 1971 the FCC required that one channel be reserved for educational use. Planning for the "wired city" has presented problems for both town planners and educators on how to use the new technology. Wiring the cities, two-way systems, satellites, and common carrier status are other dimensions of cable television to be considered. Subscriber response services and shared voice and video services are the two likely forms of cable television in the future. It is recommended that: 1) training programs for "Information Outreach Specialists" be established, 2) educators be oriented to the potential and availability of the public access channels, 3) the general public be informed of the capability of cable television, 4) small planning teams be established in each region of the country, and 5) health personnel be notified of cable television's uses. A glossary is included. (WH)

BEST COPY AVAILABLE

Center
for the Study of
Information and
Education

INFORMATION DELIVERY SYSTEMS--

THE ALTERNATIVE OF CABLE TV

John Bardwell

U.S. DEPARTMENT OF HEALTH, EDUCATION & WELFARE
NATIONAL INSTITUTE OF EDUCATION
THIS DOCUMENT HAS BEEN REPRODUCED EXACTLY AS RECEIVED FROM THE PERSON OR ORGANIZATION ORIGINATING IT. POINTS OF VIEW OR OPINIONS STATED DO NOT NECESSARILY REPRESENT OFFICIAL NATIONAL INSTITUTE OF EDUCATION POSITION OR POLICY

Center for the Study of Information and Education
130 Huntington Hall, Syracuse University, Syracuse, New York 13210

Technical change is swift; social change is slow. Everything that is necessary for the electronic delivery of letters or for telephones in motor cars or for television in the jungle is already invented. The basic discoveries were made after World War II. What has inhibited the use of these inventions is not only the enormous cost of putting new equipment in the hands of millions of people but also sheer inertia. There is an inherent conservatism in communications because the existing systems represent a huge investment and because their smooth workings cannot be interrupted. Everything new must be compatible with equipment 20 and 30 years old.[1]

The Status of Cable Television

Cable television--originally called community antenna television (CATV)--is a transmission system that carries television signals over wires (which may be underground or on utility poles) from specially built antennas to those homes, offices, schools, or other

---

[1] Brenda Maddox, Beyond Babel, p. 19.

receiving locations that are linked to the cable system. Unlike standard television, where signals are transmitted through the air waves, cable television delivers signals through a strip of copper wire within an insulating sheath in a piece of black cable, which is connected to the back of a television set.

Once individual homes or schools are wired into a cable system, the potential exists for the delivery of a wide variety of information, verbal and/or visual, to the home, schoo, or office through an appropriate terminal device associated with a TV set--a computer printout device or small teletypewriter. Persons who wish the service now pay an installation charge (usually about $15) and a monthly service charge (normally about $5 to $7). Cable TV has an enormous capacity for carrying information--10,000 times greater than a telephone line.

About six million U. S. homes (seven percent) are now wired for cable TV. By 1975, probably 25 percent of all homes will be wired with 20 or more channels. By 1980, probably 60 percent of U. S. homes will be wired. Some experts say that as early as the 1980's cable TV could form the basis for central communications stations

in most U. S. homes and schools.

The advantages of cable televison might be capsuled this way: It provides

1) Clear, ghost-free reception even in remote areas or in difficult-to-receive urban areas;
2) An abundance of channels--an almost unlimited channel capacity;
3) A greatly increased capacity for local services, since it is basically a local system;
4) The possibility of programming for selective (rather than mass) audiences--small "disenfranchised" segments of the viewing public and small ethnic groups within the geographic confines of a specific community. In a word, cable TV promises to democratize television by making it possible for local groups and individuals to plan and produce programs. This is in contrast to the highly centralized broadcast TV we know today;
5) Two-way capability that provides audience interaction.

Cable TV got its start 20 years ago in a hill-locked Pennsylvania town when a TV repairman installed an antenna on a mountain top and was able to bring TV pictures from stations in Philadelphia, some 65 miles away, to homes in the valley below. The antenna was able to catch TV signals that the mountains had previously blocked. The repairman connected a cable to the antenna and ran the cable down the mountain, on telephone poles in the streets, and to homes in the valley.

It was soon evident that cable television would be valuable not only for valley communities but also for big cities, where skyscrapers instead of mountains block signals. A high antenna on a skyscraper could pick up TV signals from faraway places and feed them to a cable, which in turn could be run into smaller buildings and apartments. A CATV system, therefore, could operate for an entire city very much in the same way that a master antenna system operates in an apartment building.

Before long it was discovered that the cable system could do many things besides carry TV and radio programming to CATV subscribers. The system could also be used to carry telegraphic traffic, fire alarms, and data communications. In addition, by means of a simple

studio camera setup, it was possible to originate as well as to receive programs on a cable system. This in turn opened up a whole new world of cable communications possibilities.

In a historic decision on August 5, 1971, the Federal Communications Commission (FCC) set forth the proposed rules and regulations governing cable TV in the future and expanded cable TV to include the nation's largest major urban and suburban areas. In its proposed rules, the FCC would require all cable TV systems not only to bring in distant signals and originate programs but also to set aside one channel for the exclusive use of education, on a developmental basis, for a five-year period free of charge.

For schools, therefore, the next five years are most important, because the FCC will decide to expand or curtail free use of these channels at the end of that time on the basis of whether the channels have or have not been used in an innovative manner. Once educators obtain the channels they are requesting, they must use these channels effectively and not "sit on them."

At the present time, CATV systems, unlike broadcast television and radio stations, are not licensed by

the FCC but operate under a franchise granted by local city or county governments. (Some communities have more than one franchise, in which case the local educators find it more difficult to ensure that all sectors of the community will have access to educational CATV.) In any given case, whether or not CATV service is provided to the schools is likely to depend on the interest and initiative of the local educational community.

Of the 2,600 franchises already issued in the United States (out of a potential pool of some 15,000 franchises to wire the entire nation), only a very few so much as mention education or the public interest. Local city fathers are awarding franchises at the rate of 25 to 30 per month. Accordingly, the NEA has taken a strong position before the FCCin urging that:

1. The FCC regulate CATV.
2. There be set aside a minimum of 20 percent of any CATV system's capacity--both standard and nonstandard channels--for educational, municipal, and public access use, and that this principle be applied to old as well as new CATV systems.

3. CATV systems in the top 100 markets be required to have a minimum capacity of 20 to 24 channels at the present state of the art and be compelled to increase channel capacity as rapidly as the technology itself develops.
4. CATV systems be required to have a two-way capability.
5. Franchises be awarded for a maximum of 15 to 20 years so that the public can review periodically whether the franchise is being operated in the public interest.
6. CATV systems provide "drop-ins" (connections between a trunk line in the street and sets in the schools) for each school free of charge from the central trunk line.
7. The FCC try to guarantee the public a fair share of public cable communications by encouraging the development of public nonprofit cable corporations in selected communities throughout the nation.[1]

---

[1] NEA, Schools and Cable Television, pp. 1-9.

The Capacity of A Cable or Two

A modern cable system usually starts with a tower constructed at a location selected for good reception. The tower usually has an antenna for each channel that is to be received. Distant signals may come to the tower by a microwave relay system.

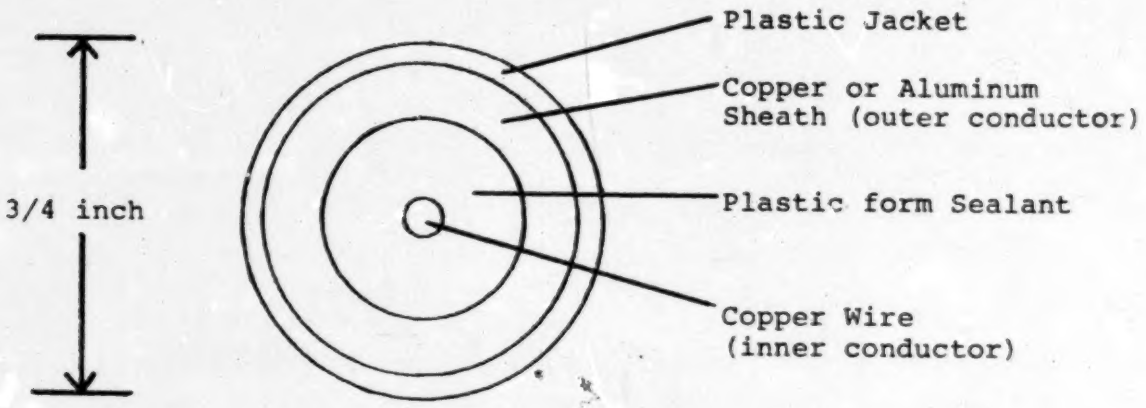
At the foot of the tower is a small control station or "headend," where the signals are brought up to maximum strength and clarity. Some of the signals may be rechanneled because it is customary to put UHF stations on empty VHF channels. Amplifiers are placed at distances of 1,500 to 2,000 feet along the trunk line to the community. These amplifiers keep the signal strong. From the main cable, feeder lines, "tap-offs," and "housedrops" carry the signals to specified streets and to the homes of subscribers. The installation fee usually runs from $10 - $20, and the monthly service charge is about $5.00.[1]

The heart of the technology is the coaxial cable itself, which enables the transmission of signals free from the interference that sometimes plagues over-the-air

---

[1]Ralph Lee Smith, The Wired City, p. 4.

broadcasting. Coaxial cable is referred to as "broadband" because it has a frequency bandwidth of 300 million cycles per second (300 megahertz). Telephone service, by contrast, has a bandwidth of 3,500 cycles per second. There is a theoretical capacity to carry over 40 television channels, each of 6 megahertz bandwidth, plus FM radio signals, still-frame pictures, and an enormous stream of data. Equipped with reversing amplifiers, messages can be sent back from the home terminal.



Ordinarily a cable TV set can receive 12 television channels. However, with the aid of a "set-top" converter the subscriber can pick up additional channels. There are for instance, 9 TV channels in the midband width between channels 6 and 7. In the current state of the

art, a single cable system with a converter has a theoretical capacity of 30 television channels.

The sub-band (below channel 2) is often utilized to provide 3 or 4 "return" or downstream channels, which enable the subscriber to transmit signals from his home terminal back to the head end. Obtaining still higher capacity per cable both downstream and upstream involves more sophisticated converters and amplifiers, which are rapidly being developed.

The CATV systems now being constructed in the major markets are built with a dual trunk (two trunk cables). Since 25 to 30 channels may provide more than adequate capacity for the present and near future. The second trunk may not be activated. However, it makes sense, both economically and in terms of tearing up the streets again, to lay both cables at once. The second cable could double home reception, or it could be used to establish a separate network interconnecting businesses, schools, hospitals and other institutions.

At the home terminal is the subscriber's TV set, a set-top converter, and an optional "black box" decoder enabling him to unscramble pay TV channels. In the future, equipment will be added to permit the subscriber

to send signals downstream. The home terminal may also include a small computer and a video tape record/playback device. If two cables enter the home, the subscriber can select either by flipping an A-B switch.[1]

Planning for the "Wired City"

The forms of advanced electronic technology that are in the front of our minds are pretty much the obvious ones--the computer, the movie camera, the electronic calculator, and above all, television in all its multifarious forms. Television includes open channel broadcasting, video tape and the video cassette and, last but not least, cable television both in its one-way form and now in its two-way incarnation.

For new town planners in general, the most immediate technological attraction is the 40 to 60 channel cable television system with its "two-way" capability. Almost every new town planner is now exploring the ultimate application of this two-way capability: the "wired city." Such a city is centered on a multi-channel underground cable system that is used to connect every home to everything else in the community. Its two-way

---

[1]Robert Steiner, Visions of Cable-Vision, pp. 19-21.

capability offers two ingenious features. It enables the home viewer to respond to what he sees on his screen by punching the right buttons on a box attached to his/her home television set. It can be used as a fire or theft "sensor," which instantly relays information from homes to the local fire or police station.

The town of Jonathan, Minnesota, is in the process of developing what it calls a "community information system," but this is still in its earliest stages. Flower Mound, Texas, is negotiating the possible establishment of the "wired city" idea in that new town. Fort Lincoln in the District of Columbia is working with Westinghouse along the same lines. Most of the "negotiations" relate to who is going to shoulder the costs--the new town developers, technology companies, or the federal government.

Last year the Committee on Telecommunications of the National Academy of Engineering submitted a report to HUD on cable possibilities and prospects. The Committee described four basic communications networks that are now technically feasible:

1. A telephone network for transmitting pictures, voice, and written material between two points.

2. A network based on existing cable television systems, which can distribute information from central facilities to offices and homes, with a capacity of as many as thirty television channels and a limited callback capacity for polling or making requests.
3. A broadband communications network carrying up to thirty equivalent television channels in both directions interconnecting major public institutions and large commercial enterprises.
4. A multipurpose city sensing network to collect data on such items as weather, pollution, traffic, vehicle location, and power status.

The NAE report concludes: " . . . many of the cities' problems are caused by high density living conditions in an era of increasingly rapid change. Communications technology, imaginatively applied, could offset the trend in which the vast majority of Americans today, and more in the future, live on a small percentage of the available land.

"We suggest an exploratory program to examine how broadband communications technology could be applied to business, government, education, health care, and entertainment to stimulate the development of existing small communities, or new communities in rural areas. As a result, people would have a viable option of settling in either urban or rural America."

This last notion is intriguing. It assumes,

perhaps quite rightly, that everyone would prefer to live in a big city if he could, and that special inducements of a highly urban nature will have to be offered in order to attract people to new towns.

What does all this mean for education in new towns (or education anywhere, for that matter?) It is very hard to say at the moment. The FCC has said that at least one channel on every cable must be reserved for public use and another for "educational" purposes. New town planners talk about connecting all of the schools with each other and with nearby universities. They also speak of piping educational programs into homes so that students can learn without going to a school. Few planners talk about turning a channel over to the students themselves, to do with as they wish.

For educators, the problem has not changed much over the past 20 years. The hardware technology exists and improves every day. We are told repeatedly that each new invention is going to transform or revolutionize education. Somehow, this never seems to happen.

The advent of two-way cable television is now being described as a possible educational breakthrough. It may, we are told, eventually provide us with more

education at reduced cost. The technology is there. Surely we should use it.

The question of cost is both crucial and complicated. If we are talking about reducing existing costs, we are talking about replacing teachers and other human being with machine technology. If we are not going to replace people, then technology is going to increase operating budgets, which is not likely to happen these days. Even if we are talking about maintaining our present cost levels but adding technology, this will still mean replacing enough people to cover the initial and continuing technological costs.

The people who are working on the Plato IV computer-aided instruction technology at the Computer-Based Education Research Laboratory at the University of Illinois hope that eventually the cost of their system can be brought down to fifty cents per hour per student. If a teacher is paid $10,000 per year for a 180-day school year and a six-hour school day (and assuming a pupil-teacher ratio of 25 to 1), a human teacher costs approximately thirty-six cents per hour per student. This is a crude comparison, leaving aside all problems of quality, experience, and efficiency (machinex can

work twenty-four hours a day all year, they don't go on strike, have children, or expect cost of living adjustments). It does indicate that technology is going to have to become very cheap if it is going to compete with human beings.[1]

Two-Way Cable Systems and the Small Operators

Two-way cable systems present special problems to small operators because they double the cost over a one-way system and they must be "tight" or finely adjusted in order to get quality reverse images. This in turn requires more highly trained technicians and more hours of maintenance.

A developing market in a model or controlled neighborhood can grow to include traffic light controls, security, home marketing, library retrieval, and electronic newspapers. New hotel and motel construction can include pay-video and pave the way to general acceptance of two-way systems.

Home reception by satellite has been restricted by the cost of the towers and the receiving equipment

---

[1] Evans, Clinchy, New Towns, New Schools? The State of the Art of Educational Planning for New Communities in the United States, pp. 76-82.

that would be required to pick up low power transmission. Ground stations costing $100,000 to $150,000 could be amortized at a cost of $1.00 to $1.50 per year per subscriber over a 10-year period if a system had 10,000 subscribers.

Small franchises might be able to organize to use one ground station that would transmit by trunk lines or microwave to the various headends.

Such a service would provide more programming at relatively low cost and provide the following advantages to the cable company:

a. Rates could be increased slightly,

b. New subscribers would be added,

c. The cable network could sell advertising.

In other words, a Spanish language program that would reach only a few people in each franchise area would be feasible if areas were linked and could receive programs via satellite from a franchise where it is economically feasible to produce Spanish language programs (Spain, Puerto Rico, etc.).

Wiring the Cities

There can be little doubt that broadband networks of some sort will come to the cities. However, the economics of a national rewiring are far less understood than the technology. To wire all of New York City would cost one billion dollars. According to one estimate of the Sloan Commission on Cable Communications, it would cost 1.3 trillion dollars to wire all of the United States.

The appeal of locally originated television may be weak. The Rand Corporation's Study of some Canadian cable systems that have presented from ten to thirty hours of local live shows every week for many years, found no evidence that it attracted enough subscribers to make cable systems profitable. Little is known about the extent to which cable systems can depend on local advertising revenue.

Until now, cable television's problems have been regulatory. Congress has been unable to make a new copyright law for the new medium, and the FCC has found it difficult to make the old Communications Act of 1934 accommodate the complexities of cable television. Yet,

once the legal obstacles are overcome, the economic ones will take their place.[1]

Satellites

In theory, satellites are little different from the microwave towers that dot the landscape. The usual kind of satellite rides 22,300 miles above the equator, and only three are necessary to make a single television audience out of almost the entire globe. Satellites have the unique capacity to receive from many places at the same time and to transmit to many more, sending the whole range of message forms simultaneously--television, telephone, telex, photo facsimile, and computer data. The distance between senders and receivers is irrelevant, and the costs of transmission are not based on the distance covered.

In December, 1972 the FCC rules that any organization with the technical and financial capability, could put up a domestic communications satellite. Several companies have received construction permits to build satellites, and it is estimated between six and ten satellites (costing $10-$12 million each) will be over

---

[1]Brenda Maddox, Beyond Babel, pp. 164-65.

North America by 1975-1976.[1]

Teleprompter, the largest cable television company in the nation, with 145 systems and 730,000 subscribers, has filed an application with the FCC to purchase and use an experimental, mobile, receiver-only satellite earth station. The earth station is being constructed by Scientific Atlanta with a demonstration planned for June, 1973. The demonstration will link Washington, D. C., and Anaheim, California, using the Canadian satellite.

Robert E. Button, Director of Satellite Services for Teleprompter, has indicated that the mobile earth station will be used to study interference and reception at stations throughout the country. "Spacecast" is the corporation that will sell services and programs using the system. Button speculated that it may be possible to use earth stations to "link" cable systems, including the 145 now owned by Teleprompter.

It appears that a significant new communications industry, with a tremendous capacity for information exchange, may be established during the next decade.

---

[1]Brenda, Maddox, Beyond Babel, pp. 65-66.

This new industry could generate demand for the following resources:

a. Personnel skilled in technological applications of the information sciences,

b. Planners to utilize the cable network for "open university" type learning needs,

c. Software designed for interactive learning,

d. Producers of programs for local cable origination.

Unless existing training programs are changed to prepare communication specialists with the skills to utilize the new developments in communication technology, it is safe to predict that the usual "implementation gap" will exist and it will be 20 years before educators are able to use these systems to meet the educational needs of a modern society.

Common Carrier Status

Proposals to separate system ownership from ownership of content are intended to reduce the owner's control over programming and motivate him to sell channel space to as many users as possible. Implementation of this proposal would have the effect of turning cable

systems into common carriers. Like telephone companies, they would provide a wire facility, but would exercise no control over who uses it.

In a wide-ranging filing with FCC on its cable rulemaking proceeding, the Industrial Electronics Division of the Electronics Industry Association proposed a nationwide cable facility organized as a common carrier. In its deliberations on the future of cable, the cabinet-level committee appointed by President Nixon has been considering common carrier status and is said to be looking favorably on it as a path of growth for the industry's future.

As a practical matter, no cable system has yet been franchised on a common carrier basis. In fact, in 1969, the Commission issued a rule requiring operators of systems serving more than 3,500 subscribers to engage in program origination.

In the future, however, municipalities should be aware that the direction of Federal policy in cable may be toward removing the cable operator from the field of programming. The leasing of channels, and the strong encouragement of community groups to use them, will favor a type of cable development that fosters diversity and

will place heavy demands on community education programs to prepare the "users" to program themselves to maximize the new information resources that would be available to them.[1]

Summary

Discussions of the future of cable television often present glowing pictures of potential two-way communications services on cable. Extensive lists of new services have been compiled. Commercial services such as security alarm monitoring, remote shopping, and computer-to-computer data transmission are typically cited as important to the economic success of cable television in cities. In addition, it is claimed that noncommercial services, such as interactive educational television in the home and direct citizen feedback on local political issues, would be of great public benefit. Impressed with these possibilities, the Federal Communications Comission has recently proposed that two-way transmission capacity be installed in all cable systems in the hundred largest U. S. television markets.

As is often the case with emerging technologies, however, the promise of two-way services on cable has at

---

[1]The Mitre Corporation, Urban Cable Systems, pp. c-17 - c-21.

times been oversold. Although most proposed new services are technically feasible, many will not be economically feasible for at least a decade. Others can probably be best accommodated on the telephone network or by other means. Some may not be desirable at all. The value to society of, and the commercial demand for, various new cable services is, in general, unknown at the present time.

Meeting the FCC's proposed requirement for two-way transmission capacity will add between 15 and 30 percent to the capital cost of a single cable, one-way distribution plant. Transmitting two-way signals at different frequencies on the same cable, or using separate cables for signals in each direction, are the principal techniques that will be used. Providing two-way capacity is, however, very different from providing two-way services. The latter requires a considerable investment in equipment at a central facility and at each subscriber's location. Subscriber terminal equipment will in fact represent the bulk of added capital costs for all large two-way systems. Eventually, programming and other software costs will be greater than hardware expenditures if two-way cable services prove successful.

This study groups proposed cable services according to their technical requirements and the estimated capital costs to provide them. Interactive services are separated into four categories:

1. Subscriber response services, such as opinion polling or alarm monitoring, in which individual subscribers (or equipment installed at their location) send short data responses to queries from a central point.
2. Shared voice and video services, such as instructional television with voice feedback, in which individuals share return channels to a central point.
3. Subscriber initiated services, such as catalog ordering or ticket sales, in which individuals can request information or service from a variety of sources.
4. Point-to-point services, in which one subscriber transmits video, voice, or data information directly to another.

On the basis of the projected cost for subscriber terminal equipment alone, subscriber-initiated and point-to-point services appear too costly for mass home audiences in this

decade, although some business and institutional uses may be feasible. Formidable problems in developing computer software for subscriber-initiated services can also be expected.

Subscriber response services, perhaps with shared voice return channels, seem more likely candidates for home use in the next five years. The investment cost for the basic two-way equipment required would amount to roughly $150-$340 per subscriber, over and above the $125 per subscriber calculated for conventional one-way cable service. Two-way service that could be provided with this equipment include audience counting for advertisers and programmers, remote shopping, interactive entertainment and instructional programming, opinion polling, and selection of subscription or limited access channels. Other response services such as meter reading, fire alarm monitoring, and environmental monitoring would require additional equipment. More sophisticated and costly services such as information retrieval and computer-aided instruction could be added to the basic response system as they prove feasible.

With this capital investment and reasonable assumptions about operating costs, a cable operator

would need additional monthly revenues of between $4.50 and $13.00 per subscriber to break even on two-way response services. This means doubling or tripling his present monthly revenue from one-way television distribution. Most of the added revenue would have to come from increased monthly subscriber fees, although advertisers, business firms, utilities, school, and government users would pay for services of benefit to them. Expected revenues from specific services cannot be estimated at the present time, since no real field experience or evidence of consumer demand is yet available. Providing a mix of response services supported by home subscribers, business, and government users appears to be a better strategy for the cable operator than supplying a single service alone.

Several cable systems began field tests of two-way transmission in 1971. These tests indicate that two-way transmission on a single cable is indeed feasible but will require greater attention to system design and construction than has been the industry practice to date. Tighter standards for system components and installation procedures will be necessary. Moreover, building two-way capability into a cable system from the beginning

is considerably easier than retrofitting an existing one-way system. Even without an FCC requirement, most large calbe operators are likely to include two-way capability in new urban systems.

The FCC's proposed rules, then, would make uniform an industry trend toward provision of two-way capability in major market cable systems. Since the widespread acceptance of two-way cable services will require step-by-step development over a number of years, the Commission and other concerned parties have time to consider the several policy issues raised by this new technology. These issues include the development of technical standards, protection of individual privacy, and definition of the role of the cable operator as common carrier or direct provider of two-way services.[1]

Recommendations

1. A training program for "Information Outreach Specialists" should be organized and should include most of the following skills:

    a. Needs-assessment, development of goals and objectives, developing functional specifications, planning a learning system.

---

[1]Walter S. Baer, Interactive Television, pp. V-VII.

b. Basic electronics, the development of technical specifications, evaluating system function.

c. The process of planning, organizational behavior, the basic elements of behavior modification, the process of community change.

2. Media production programs should be modified to prepare specialists with the skills to assist groups with the production of low budget television programs for use on the public access channels available on cable systems.

3. Educational resources should be made available to educators to orient them to the educational potential of the public access channels available on cable systems.

4. Consumer information programs should be developed on inform subscribers or potential subscribers of the capability of cable television and their role in planning for more effective utilization of services in their communities.

5. Until skilled information specialists are available to participate in planning activities, small planning teams should be developed in each region of the country to assist local agencies with planning, implementation and training programs. The collective skills of the planning teams should include the skills recommended for Information Outreach Specialists in the first recommendation.
6. Inservice training programs in hospitals for allied health personnel should include skills in the utilization of cable television for medical applications.

Observations

1. Many of the small cable companies that are required by the FCC to provide origination facilities are reluctant to become involved with the educational institutions that are seeking more than a "free" channel. They tend to feel that educators are unrealistic about the operating costs involved with two-way systems.

2. The "black box" issue, so familiar to educational technologists, has appeared in cable technology in the form of a "responder." Thus, we find promoters pushing the hardware at the expense of needs-assessment.
3. Consumers are willing to pay for entertainment, but education is difficult to sell. The capacity of the cable system must include an inexpensive black box, which is included with the installation. This will enable the consumer to have access to the educational service when he feels the need.
4. Cable systems could provide communicatiin links with students who are enrolled in a "university without walls." However, because cable systems aren't connected in a network, the user would have to determine which systems reach their students and meet the origination requirements of each franchise owner.
5. Cable systems could be common carriers, transmitters of commercial and educational broadcasts, program originators, a fourth network, or victims of satellite technology. The role

of the FCC is evolving slowly, and a new copyright law still eludes us. The future of cable information systems is difficult to predict because there are so many factors that can influence its development during the next decade.

6. Subscribers will not effectively utilize the communications potential of cable unless adult learning programs are organized to orient and train potential users.
7. Medical needs are being met through the use of two-way cable systems, and this may be one important application that will convince the subscriber of the value of other nonentertainment cable services.
8. Pay television systems, installed to show movies in hotels, may be the subscriber's first experience with a two-way system, a channel converter, scrambled pictures, pay TV, and other applications of cable technology.
9. Cable technology may create a new labor market that will use teams of individuals with special

skills until a program can be established to prepare specialists with the skills required.

10. The implementations of cable technology will be slowed by the blocking activities of the telephone industry and the television broadcasters as well as reluctant subscribers who feel threatened by the implications of a "wired city."

Glossary of Terms[1]

Community Antenna Television (CATV)--A community antenna television system is usually composed of three basic parts:

1. A master antenna usually located on high ground where reception of "off-the-aire" television signals is good,
2. A "headend" where the signals are filtered, translated, and amplified for retransmission to the coaxial cable distribution system,
3. A coaxial cable distribution system that may be capable of carrying 5, 12, 20, or even more video channels to the television receivers of individual subscribers.

The concept was conceived and first implemented 20 years ago merely as a community antenna transmission service to furnish reviewers in rural areas with clear, multichannel reception, but through the years has come to be known as cable television, encompassing a wide range of telecommunications services that can be carried by coaxial cable.

Cable Television--An overall term denoting the transmission of TV and other information through a broadband network of coaxial cables to the homes of individual viewers. Cable television is commonly referred to, along with community antenna television, as CATV. The inclusion of such nonbroadcast services as original TV programming makes "cable TV" a more accurate term than community antenna television. In its earliest form a cable television, or community antenna television, system had a latent capacity to deliver 12 broadband channels into the home although these were not needed or required during the early state of the art. Arthur Singer points out: "Since the fifties, two technological advances have taken place. First, the basic channel capacity of the coaxial system moved up into the rante of 20-25 channels, and then toward the range of 40 channels; the next move, not too far off, is likely to be toward a range of 80 to 100 channels. Second, synchronous

communications satellites offered the promise of cheap and flexible interconnections among distinct cable systems."[1]

Closed-Circuit Television (CCTV)--Cable, within one or more more buildings, owned by the educator or leased from the telephone company. This is not franchised as is CATV.

Coaxial Cable--The "magic wire," about the thickness of a fountain pen, used for transporting the signals that make up television pictures.

Standard Chennels--Those channels that can be tuned on a conventional TV set.

Nonstandard Channels--A 6-megacycle band of frequencies that fall below Channel 2, between Channels 6 and 7, or above Channel 13. Such channels cannot be used by broadcast television because those frequencies are assigned for other purposes, but they can be used on the cable.

"Drops"--Individual connections from the main feeder trunk cable line to the individual subscriber's set.

"Head End"--The electronic control center of the CATV system where incoming TV signals are amplified, filtered, and converted to appropriate cable system channels.

Low-Band VHF--Frequencies up to Channel 6.

Pay TV--A programming service in which the subscriber[2] pays for each program he selects. The CATV subscriber, on the other hand, pays a monthly service charge rather than for individual programs.

Instructional Television Fixed Service (ITFS)--The Federal Communications Commission recently opened 31 channels in the 2500-2690 megahertz frequency range for use by educational institutions and organizations primarily for the transmission of instructional and educational programs to schools and colleges. ITFS is a point-to-point service from a transmitter to one or more designated receiving locations. Although the signal is transmitted in much the same way as is the broadcast television signal, it requires a special

receiving antenna and down converter unit and can be received only in those buildings so equipped. In short, ITFS is a private distribution system in which preselected receiving points are connected by radio signals instead of by cable.